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ABSTRACT

This action research project evaluated a program for decreasing the gap in achievement levels among primary and secondary level students in the targeted schools. The subjects, from various cultural and socioeconomic backgrounds ranging from lower to upper-middle class, were students in Chicago city and suburban public and Catholic schools. The problem of the discrepancies in achievement levels was documented through standardized tests, teacher grade books, and teacher observation. Based on current ideas in educational literature and on-site teacher interviews, it was determined that probable causes for this problem included traditional views toward teaching and learning, lack of active student involvement, curriculum mandates, and time restrictions. Intervention based on teaching with the multiple intelligences and incorporation of teaching strategies such as cooperative learning groups, projects, and metacognitive processing, will determine if discrepancies in achievement levels will be minimized. Assessments supported the use of multiple intelligences strategies at both the primary and secondary levels. Twenty-one appendices include parent multiple intelligences checklist, teacher survey and interview form, student multiple intelligences checklist, primary interpersonal and intrapersonal activities, and activities related to each of the seven intelligences. Contains 50 references. (Author/SD)

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TEACHING WITH MULTIPLE INTELLIGENCES

St. Xavier University & IRI/Skylight
Field-Based Master's Program

An Action Research Project Submitted to the

Graduate Faculty of the School of Education

in Partial Fulfillment of the Requirements for the

Degree of Master's of Arts in Teaching and Leadership

by

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Action Research Project

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Submitted: May, 1997

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ABSTRACT

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Date: May 1, 1997

Title: Teaching With Multiple Intelligences

Abstract: This report describes a program for decreasing the gap in achievement levels among primary and secondary level students in the targeted schools. The students come from various cultural and socioeconomic backgrounds ranging from lower to upper-middle class. They are products of Chicago city and suburban public and Catholic schools. The problem of the discrepancies in achievement levels is documented through standardized tests, teacher grade books, and teacher observation.

Based on current ideas in educational literature and on-site teacher interviews, some probable causes for this probelm include traditional views toward teaching and learning, lack of active student involvement, curriculum mandates, and time restrictions.

Intervention based on teaching with the Multiple Intelligences and incorporating teaching strategies such as cooperative learning groups, projects, and metacognitive processing, will determine if discrepancies in achievement levels will be minimized.

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Chapter 1

PROBLEM STATEMENT AND CONTEXT

General Statement of Problem

Students in targeted schools exhibit varied levels of achievement. Evidence for the existence of the problem includes surveys, interviewing, and testing. The purpose of this study is to determine if teaching with the Multiple Intelligences affects student academic achievement in the classroom.

Description of Immediate Problem Setting

The above problem has been identified at five separate sites located in different Chicago and south suburban communities of Chicago, Illinois. Three of these are elementary schools and will be referred to as "School A," "School B," and "School E" throughout this study. One of the schools is a junior high and will be referred to as "School C." The other site will be referred to as "School D," which is a high school.

School A:

Oliver S. Westcott Elementary School houses 575 students in grades pre-kindergarten through eighth. The building was constructed in 1976. Based on the 1994-1995 school year figures, the average class size is as follows: kindergarten - 31.5, first grade - 24.0, third grade - 24.3, sixth grade - 28.5, and eighth grade - 23.0. As of September 30, 1994, the racial/ethnic makeup reported for School E students was 100% Black. The district's overall population is 11.3% White, 54.7% Black, 30.6% Hispanic, 3.2% Asian or Pacific Islander, and 0.2% Native American. The percentage of Low Income students is 94.6%, which is higher than the district's rate of 79.8%. The

attendance rate at School E is 91.4% with a student mobility of 34.2%. The chronic truancy is 11.5%. The number of chronic truants is 63 (City of Chicago School District 299 Report Card, 1995).

Students in third, sixth, and eighth grades are assessed by the State in reading, math, and writing, using the Illinois Goal Assessment Program. Fourth and seventh grades are state-assessed in science and social science. In addition, students in grades one through eight are given the Iowa Test of Basic Skills. All students are assessed quarterly on a district-wide report card. Students in grades one through eight receive letter grades consisting of A (90-100), B (80-89), C (70-79), D (60-69), and F (0-59).

Scores for this targeted school are below the State of Illinois scores at all levels in every subject area. All subject areas and grade levels need improvement.

The average teaching experience in the entire district is 14.3 years. Fifty-eight and nine-tenths percent of the teachers have a Bachelor's Degree, and 40.5% report a Master's and above. The pupil-teacher ratio is 20.5:1. The teacher salary for the 1994-1995 school year is $41,627, and administrator salary is reported at $65,518. The operating expenditure per pupil is $6,525.

School B:

Neil Armstrong Elementary School is one of four schools in Elementary School District 159. The campus was constructed in 1973 and has since undergone improvements and enhancements. Bond issues financed major building additions in 1976, 1978, and 1981. One recent technological improvement was the cabling and wiring for networked computers. Based on the 1994 - 1995 school year

figures, the average class size for each grade level is as follows: kindergarten - 16.0, first grade - 13.3, second grade - 22.4, third grade 23.0, fourth grade - 18.4, fifth grade - 19.0, sixth grade - 17.7, seventh grade - 18.5, eighth grade - 20.3. There are three classes each of grades kindergarten, third, seventh, and eighth, and two classes each of first, second, fourth, fifth and sixth. The building is an air conditioned, closed-class structure consisting of a junior high wing with six classrooms housing seventh and eighth grades. Kindergarten through sixth grades are housed in the remainder of the building in sixteen classrooms. The building also houses two gymnasiums and a media center. School B contains an inclusion program; one special education class, and a special education support staff of seven teachers and four teacher aides. As of September 30, 1994, the racial/ethnic makeup reported for School B students was 76.1% White, 19.6% Black, 2.4% Hispanic, and 2.0% Asian or Pacific Islander. It should be noted that the district's overall White population is 39.1% and Black population is 57.0%. The Hispanic and Asian or Pacific Islander populations do not show a significant difference in percentages. The percentage of Low-Income students is 4.8% which is much lower than the district's percentage of 16.0%. The attendance rate at School B is 95.8% with a student mobility of 6.8%. The number of chronic truants is 0 (Elementary School District 159 Report Card, 1995).

The staff at School B is comprised of 42 teachers, 40 female and 2 male. Eighteen teachers have their Master's Degree. The average number of years experience is 14.5. The racial/ethnic background is 40 White, 2 Black, and 1 Asian Pacific Islander. The average teacher salary is $39,690. The operating expenditure per pupil is $5,802.

Students are heterogeneously assigned to a classroom. Core subject areas and time devoted to them are as follows: mathematics - 60 minutes, science - 30 minutes, language arts - 105 minutes, and social studies - 30 minutes. In addition to core subjects, students in grades one through eight receive six 40 minute periods of art or music, and physical education each week. Kindergarten students receive three 30 minute periods of physical education and two 40 minute periods of combined art and music.

Students in third, sixth, and eighth grade are assessed by the Illinois Goal Assessment Program in reading, math, and writing. Fourth and seventh grade are also assessed in science and social studies. In addition, students in grades one through eight are given the California Test of Basic Skills. Kindergarten students are given the Metropolitan Readiness Test. All students are assessed quarterly using a district-wide progress report. Students in grades three through eight receive letter grades consisting of A (92-100), B (85-91), C (70-84), D (60-69), and F (0-59). Students in grades one and two receive S (satisfactory), N (needs improvement), and U (unsatisfactory). Students in kindergarten receive + (satisfactory), - (needs improvement), and L (little progress).

Scores for this targeted school district are above the state scores at all levels in every subject area. The areas targeted for improvement include: curricular revamping of the mathematics program at all levels, technology upgrades in school libraries, introduction of calculators into the curriculum, and a "no-nonsense" discipline policy aimed at improving the learning environment for all (Elementary School District 159, 1995).

School B offers state-of-the-art computer education consisting of a curriculum devised by district teachers. *Ideal* software is used to reinforce all areas of the curriculum. Classroom teachers are responsible for computer activities and are assigned at least one time slot per week for the use of the computer lab. In addition to the lab there are four computers in each classroom hooked up to the main frame. A part-time computer resource teacher is available every day.

School B has an active Parent Teacher Organization. Parent volunteers help whenever needed. The principal also has a parent committee which meets once a month to discuss community/school concerns.

School C:

Kirby School District #140 in Tinley Park, Illinois, is located south of Chicago. Kirby School District educates 4,573 students in seven schools: five elementary, and two middle schools, one of which is Prairie View Junior High.

Prairie View Junior High follows a Middle School philosophy. It is a three year old triangular shaped structure equipped with air conditioning and the latest technology. Each grade level is contained in a separate wing. There are 46 White teachers, 35 female and 11 male, which include a counselor, social worker, learning resource teacher, band instructors, speech pathologist, transition program instructor, and health personnel. The average teaching experience is 12 years, and 47% of the teachers have a Master's Degree or above.

The total enrollment of the school is 740 students. The racial/ethnic makeup of the school is White 95.5%, Black 0%, Hispanic 2%, Asian or Pacific Islander 2.3%, and

Native American 0%. Low income stands at .8% for the school, and 1% for the district. The number of Limited English Proficiency students was .5% lower than the District's 1.4% average. The attendance rate is 96.3% with truancy 0%. The student mobility rate for the school is 12.2% and the District is 8.8%.

Students at Prairie View are assessed by both the Illinois Goal Assessment Program (IGAP) and the California Test of Basic Skills (CTBS). There are also District mandated local assessment tests in grades six, seven and eight. Students are assessed quarterly on report cards. The Better Schools Accountability Law (Section 10-17a of the School Code) requires all public schools in Illinois to report on the performance of their schools and students through school report cards. Average IGAP scores in reading, math, science, and social science are reported on a 0-500 scale. Average scores for writing are reported on a 6-32 scale.

Based on the Illinois State School's Improvement Plan, the following areas of success were reported for Prairie View Junior High:

grade six students achieved a score of 23.7 in writing.

grade seven students achieved a score of 276 in science.

grade eight students achieved a score of 26.8 in writing.

There are six teams, two at each grade level: sixth, seventh, and eighth. The average class size for sixth grade is - 24.7, seventh grade - 27.7, and eighth grade is - 29.6. The time devoted to the teaching of each core subject is 42 minutes per day.

Curriculum consists of the five core areas: language, reading, math, social studies, and science, with a program in enrichment and modern life skills. Enrichment consists of

computers, applied technology, art, and music. Physical education consists of physical education, health, and modern life skills. There is a clustering of both gifted and talented enrichment (GATE) students and special education students. The GATE students meet once a week with the Gifted coordinator. There is available for special education students both a learning resource lab and self contained classroom. The media center is available to all students and staff which includes such modern technology as info-trac and the internet (also available in the science labs).

School D:

School D is a co-educational Catholic high school located in a predominantly middle-class suburb 36 miles southwest of Chicago. Providence Catholic High School (PCHS) has been located in suburban New Lenox since 1962. It is an H-shaped, one-level building with 39 classrooms, a modern resource library, state-of-the art computer lab, two gymnasiums, a cafeteria, fully-equipped kitchen, and a faculty room. Outside there are six athletic fields and a tennis court. PCHS owns its own school buses that provide to-and-from transportation for its non-driving students. A pre-school located on the property has been operating under the sponsorship of PCHS since 1992.

Since 1985, School D has been run by the Augustinian order of priests from the Midwest Region of Our Mother of Good Counsel; and it is under the jurisdiction of the Joliet Archdiocese. It is administered by a president, a principal, an administrative board, an advisory board, an assistant principal, and a dean. School D is accredited by the Illinois State Board of Education, the North Central Association, the Augustinian Secondary Education Association, and the National Catholic Education Association.

School D exists to serve the needs of the Catholic Christian Community of the Joliet and Chicago suburban areas. It is dedicated to its philosophy of developing and nurturing the self-esteem and the intellectual and social skills of its students. Students of all faiths and races are accepted. Of a total enrollment of 1,177 students, 49 are Black, 76 are Hispanic, 8 are Asian, and 7 are American Indian. White and all others total 1,037. At the end of the first semester of the 1995-1996 school year, there was a 96% attendance rate.

The faculty consists of 8 full-time religious teachers and 63 full-time lay teachers. All are certified by the State of Illinois, and over half have advanced degrees. Salaries range from $21,000 for a first-year teacher with no prior experience to $47,526 to a teacher with 31 years experience and a Master's Degree plus thirty hours. The average teaching experience at School D is nine years. In addition to the faculty, School D has four guidance counselors, one college counselor, a full-time librarian, an office manager, a bookkeeper, and a full-time kitchen and maintenance staff totaling eleven people.

School D is a college-preparatory high school and takes a traditional approach toward learning. Its students must meet the following requirements: four years of theology, four years of English, three years of math, three years of a laboratory science, three years of social science, two consecutive years of a foreign language, and one semester of Economics I and/ or II. Electives such as band, choir, and art must total 22 credit hours for four years. Students may participate in any one or more of the approximately 30 extra-curricular activities offered. All students are required to take the American College Test (ACT). The composite ACT score for the second semester of

1996 was 21.6. Ninety-eight percent of the students continue their education: 75% in four-year colleges, 15% in two-year colleges, and 8% in technical colleges.

School D offers a Summer Studies Skills Program, an Academic Adjustment Program, a Tutoring Program, a Student Assistance Program, Peer Counseling, and Spectrum. Through its Pastoral Department, the Augustinian Youth Ministry (AYM) was formed. It has sponsored many drives such as blood, food, clothing, and toys. Students participating in AYM also do outside tutoring and work in soup kitchens and hospitals.

School D receives most of its financial support from an annual per student tuition of $3,500 and through its one major fund raiser of the year, The Harvest Drive. Other revenue is generated by the Father's Club, the Mother's Club, and donations from the private sector.

School E:

Armour Elementary School houses 518 students in grades kindergarten through eighth. Based on the 1995 School Report Card figures, the average class size for each grade is as follows: kindergarten - 28.5, first grade - 24.0, third grade - 28.5, sixth grade - 26.0, eighth grade - 32.5. There are two kindergarten classes, one bilingual and one monolingual, three classes each of first and second grades with one bilingual and one monolingual, and two classes each of fourth, fifth, sixth, seventh, and eighth. There are two aging buildings. The main building houses the kindergartens and one each of third through eighth grades. The second site houses first, second and third grade classrooms, and three Learning Disabled classes.

As reported in the 1995 School Report Card, the racial/ethnic make-up for Armour students was 19.9% White, 1.5% Black, 77.6% Hispanic, 0.8% Asian or Pacific Islander, 0.2% Native American. The percentage of students eligible for bilingual education is 35.7%, much higher than the district average of 14.9%. The attendance rate at Armour is 92.9% compared to 89.2% district wide. The student mobility rate, which is based on the number of times students enroll or leave a school during the course of the school year, is 33.9%. This is slightly higher than the district rate of 30.0%.

The pupil-teacher ratio in the elementary schools is 20.5:1. The average teacher salary is $41,627, and the average administrator's salary is $65,518. The operating expenditure per pupil for the 1993-1994 years was $6,525.

District information available about the racial/ethnic background of the staff stated that out of a total of 22,513 teachers, 45.3% are White, 43.6% are Black, 9.0% are Hispanic, 1.8% Asian or Pacific Islander, and 0.3% are Native American. The average teaching experience is 14.3 years. Fifty-eight point nine percent of the teachers hold a Bachelor's and 40.5% hold a Master's Degree or above. Students in third, sixth, and eighth grades are assessed by the state in reading, math, and writing. Fourth and seventh grades are state assessed in science and social studies. Also, students in grades first through eighth are given the Iowa Test Of Basic Skills. All students are assessed quarterly on a district wide progress report. A Learning Disabilities Program, English as a Second Language, Transitional Bilingual Program, and Elementary Secondary Education Act (ESEA) programs in reading and math are available to students in the upper grades.

Options For Knowledge is a program available to gifted students in the upper grades. Students participate in a library program twice a week.

Description of Surrounding Community

School A:

Oliver S. Westcott Elementary School is located in the City of Chicago. Westcott and the surrounding schools are a part of Educational Region Five. In this sub-district, the enrollments were reported as of September 30, 1994. The White students comprise 2.7%, Black students 86.7%, Hispanic 10.3%, and Asian or Pacific Islander 0.2%. The total sub- district enrollment is 27,295.

In the sub-district low-income students make up 89.8% of the population. Limited English Proficient is reported at 6.1%. Attendance at the sub-district level is reported as 90.8% with a student mobility of 35.6%. A chronic truancy rate of 4.6% results in 1,173 chronic truants.

The teacher and administrator information is reported for the entire City of Chicago Public Schools. The total number of teachers is reported as 22,513, with 24.5% male and 75.5% female. White teachers comprise 45.3%, Black teacher 43.6%, Hispanic teachers 9.0%, Asian or Pacific Islander teachers 1.8%, and Native American 0.3%.

School B:

School B is located in a village community, thirty miles from Chicago. The population of the village is 10,500. The village is comprised of 74.5% White residents and 22.2% Black residents. The remaining populations are 2.9% Hispanic, 1.9% Asian Pacific Islander, and 1.5% Native American, Eskimo, Aleut or other races (United States Census

Bureau, 1991). The median age of the population is 31.8 years. Eighty-seven point two percent of the residents speak English in the home, and 2.0% speak Spanish or Spanish Creole. The majority of the remaining population speaks a foreign language (United States Census Bureau, 1991).

According to the Census Report, 39% of the population is married, with both spouses living in the house. Fifty-two percent is employed. Ninety-two and one-half percent of the residents is above the poverty level and 4.4% is below the poverty level. In 1995, the median income was reported at $45,723. According to the same report, the mean income was $48,028. The median value of a house was $84,500. In recent years, the makeup of the area has shifted from white collar residents towards more blue collar workers in the immediate surrounding area (Neil Armstrong Elementary School Administration, 1994).

The educational level of the community shows that 30% are high school graduates; 25% have had some college but did not receive a degree; 14% have their Bachelor's Degree; 6.9% have an Associate's Degree; and 6.7% have a graduate or professional degree (United States Census Bureau, 1991).

Community financial support of the schools was apparent when a school referendum was passed in 1993. The referendum permitted the school to invest in the purchase of computers and software to aid in the instruction of students. As a result, the school has at least four computers in each classroom and a fully equipped computer lab.

School C:

Tinley Park is an upper-middle class community with a median family

income of $56,719. It is a predominantly residential community without a strong industrial base. The school district is supported by local taxpayers. Tinley Park consists of 13.8 square miles with a population of 40,000. As of 1992, the average home value in Tinley Park was $139,611. More than 95% of the population was White, and the median age was 33.

Of the population, 32.7% are high school graduates, 24.6% have some college credit, 7.1% have an Associate Degree, 14.5% have a Bachelor Degree, and 6.4% have graduate degrees. Part of the labor force consists of 9.9% having some high school credit and 4.8% having only elementary school experience (Tinley Park Census, 1993).

Rezoning of the available land in the community has led to a substantial growth in housing. This has had a significant impact on the school district and the tax base. The result is an increased taxpayer interest in school funding.

School D:

School D draws its students from over 70 elementary and junior high schools within a radius of 30 miles. The area contains suburban Chicago towns, a small city, Joliet, and a large rural area with many farms. Close to 60% of the students' fathers and over 50% of the students' mothers are college graduates or have had some college education. Thirty percent of the parents are in professional occupations while 25% are in managerial positions. School D is a closely knit, family-oriented community school, and it keeps it loyalties by giving first consideration to the children or grandchildren of former alumni and those recommended by the faculty and staff.

Future consideration as to its possible expansion is the completion of I-355, the proposed Peotone airport, and the increasing development of surrounding farmland into residential areas. In the meantime, funds are being used to enhance and maintain the present school building and property.

School E

Unit District 6 is located in the City of Chicago. In this district, 11.3% of the population is White, 54.7% Black, 30.6% Hispanic, 3.2% Asian or Pacific Islander, 0.2% Native American, with a total enrollment of 402,136. Of the 402,136 students, 79.8% are from low-income families while 14.9% are Limited English Proficient.

Of the 22,513 teachers, 45.3% of the population is White, 45.3% Black, 9.0% Hispanic, 1.8% Asian or Pacific Islander, 0.3% Native American with 24.5% male and 75.5% female. The average teaching experience for this district is 14.3 years. Teachers with Bachelor's Degrees make up 58.9% of the population with 40.5% at Masters level or above.

Armour Elementary, a member of this Unit is located in the neighborhood of Bridgeport. In this local school district 19.9% of the population is White, 1.5% Black, 77.6% Hispanic, 0.8% Asian or Pacific Islander, and 0.2% Native American. Low-income families make up 99.7% with 35.7% Limited English Proficient. There are three rival gangs in the neighborhood. This causes great concern for the children's safety. The community is dealing with this issue through the Chicago's Alternative Policing Strategy Program (CAPS). This program is designed to promote greater citizen involvement with

the police. The Parent Patrol is another community group available to assist the children. The main academic focus is to continue to improve reading and math grades.

Regional and National Context of Problem

The concern with student achievement is a prime concern in education today. How an individual achieves success is one that merits study.

Drawing on the basic notion that students bring multiple abilities with them to school and that school can offer a much richer range of opportunities than is commonly emphasized, several ongoing efforts have shown how the perspective of Multiple Intelligences Theory can help more students capitalize on their skills (Costa, Bellanca, & Fogarty, 1992). Different students may be reached in quite different ways, and the disciplinary expert emerges as one who can exhibit his master in multiple, flexible modes (Gardner, 1991).

Recent research on how the brain works gives today's educators the opportunity to maximize desired outcomes from their students. Activating different parts of the brain can automatically activate other parts of the brain. Restak says that "the dynamic interplay of neural activity within and in between systems is the very essence of brain function." Pribram writes that the brain has "holographic" tendencies and that many functions, including sensory input, work in parallel concert. In short, the research on the brain does not validate that we are singularly processing input of learning with a single sensory input (Jensen, 1995).

Hart indicated that the brain simultaneously operates on many level processing all at once a world of color, movement, emotion, shape, intensity, sound, taste, weight, and

more. It assembles patterns, composes meaning, and sorts daily life experiences from an extraordinary number of clues. This amazing multi-processor can be starved for input in a typical classroom. The typical response is often frustration or boredom (Jensen, 1995).

Traditional group instruction does not lend itself to individualized and complex learning. Five senses are taken in and each is individually prioritized. The body's hormones are being released at specified periods. Learning is all multi-processing; the learner is immersed in sensory input, and the brain makes meaning out of it. In short, any lock-step sequenced teaching ignores the real complexity of the brain (Jensen,1995). Based upon this information, one may assume that the traditional classroom approach to learning inhibits academic achievement because it does not accommodate the multi-sensory approach to brain-based learning.

CHAPTER 2

PROBLEM DOCUMENTATION

I. Sources of Problem Evidence

A. Parent copy of Multiple Intelligence Checklist was administered. (Appendix A)

B. Teacher's Strategy Survey was administered. (Appendix B)

C. California Test of Basic Skills (CTBS) scores were consulted.

D. School report card was consulted.

E. Metropolitan Readiness Test (MRT) was consulted.

F. Grade books were consulted.

II. Supporting Data for Probable Cause

A. Teacher interviews were administered. (Appendix C)

B. Survey of personal teaching experience was administered. (Appendix D)

III. Probable Cause

Academic achievement is a measurable growth in a specific area of instruction. This growth results from the development and use of the different intelligences. It can be measured through various assessment techniques which reflect the different learning styles of our students.

The purpose of this study is to determine if teaching with the Multiple Intelligences will decrease the gap in achievement levels among students in the classroom. All students are capable of learning; each learns in different ways. All ways of learning are acceptable. A look at traditional views of intelligence shows us how Howard Gardner's theory can open of new avenues for education. (McClaskey, 1995).

Research has indicated that there is a need for change in current teaching methods. The American school system was invented in the late 1800's, as cited in Why Do Schools Flunk Biology? (Darling-Hammond, L. 1996), and little has changed since then. The extent of the problem stems from administrators and teachers following tradition rather than tuning in to what is relevant to our students today. Armstrong says, "In traditional education, we try to remake children to get them to learn in our way. In fact, we need to remake the way we teach so that it fits the kids." (Kennedy, 1994, p. 59).

Much of the research devoted to change in education today is based on what seems obvious, such as the impracticality of existing high school starting times. Often a school system makes changes based on monetary rather than educational concerns (e.g. the elimination of physical education and fine arts programs).

Teachers using traditional methods of instruction are finding out that the lack of stimuli in their instruction results in boredom and loss of interest. Children need to become more actively involved in classroom learning in order to improve their retention of the material presented. Knowledge is retained longer if children connect, not only aurally, but also emotionally and physically to the material. (Sylwester, 1996). The Guggenheim School in the inner-city of Chicago clearly demonstrates Sylwester's idea. The principal and teachers trained in multisensory teaching strategies moved the school's academic rank from 17th place in the district to 1st place in one year. (Lazear, 1991).

Other schools around the country have also experienced success based on Gardner's Theory of Multiple Intelligences and, his theory is gaining more followers.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

Gardner's Theory of Multiple Iintelligences maintains that we all possess several different and independent capacities for solving problems and creating products. (Gardner, 1991).

Through research, Gardner has determined that there are seven intelligences:

Verbal/Linguistic - using written and oral language.

Musical/Rhythmic - creating musical and rhythmic patterns and listening to music.

Visual/Spatial - comprehending and interpreting the visual world through pictures or sculptures.

Intrapersonal - reflecting on one's own self.

Bodily/Kinesthetic - ability and talent to move one's body in meaningful ways.

Interpersonal - ability to reach out and work with others.

Logical/Mathematical - solving problems using reasoning, patterns, and numbers.

Gardner agreed with other theorists that the brain had left and right hemispheres that process information. However, he feels that there are many intelligences within the brain. (Chapman, 1993).

The development of each intelligence depends on how an individual is nurtured. Modern research has disproved the misconception that all intelligence is fixed. These intelligences can be nurtured and developed. (Chapman, 1993).

By alluding to philosophers and theorists who pondered how the human brain learns, Gardner speculated that any given individual might have several intelligences that manifest themselves in different ways. Gardner and his associates speculated that these Multiple Intelligences exist in unique combinations in each individual. (Gardner, 1989).

Since Socrates' time, many astute individuals have speculated on the nature of human learning. In the 17th Century, Renee Descartes (cited in Mainzer, 1994) proposed his dualistic model of brain and body, now referred to as rationalism.

In contrast to holistic philosophy and the tradition of Aristotle and Avicenna, Descartes and the rationalists taught a dualistic ontology strictly separating mind and matter, body and soul. (Mainzer, p. 110). Gardner, of course, does not accept such a dualism. He thinks much knowledge has to be built into an organism's nervous system in order for that organism to acquire these systems of knowledge. Then the triggering circumstances must be located under which such knowledge can make its appearance. (Gardner, 1991, p. 33).

Growing from both the empiricist and the rationalist philosophies, Kant (1781) tried to synthesize both views. Closer to rationalism, he believed in mental structures, cognitive schemes, and categories in order to organize experience and cognition. (cited in Mainzer, p. 113). In 1835, Johannes Muller supported Kant's theories with experiments showing sensations could be elicited by mechanical or chemical influences. (Mainzer, p. 114). Emil du Bois Reymond's research in the mid-1800's resulted in the explanation of brain structure as a complex system of nerve cells (neurons). (Mainzer, 1994)

William James (1890), influenced by Darwinian theory, proposed that the human mind has evolved with its environment. James believed that our learning occurs through associations formed by new information and past information. (Mainzer, 1994).

Piaget, through intensive observation, studied cognitive growth in a small sampling of children. He concluded that there were sequential developmental stages common to all children. He believed that the capacity to learn was innate, but that this capacity must be actively developed through the interaction of the child with his/her environment. Intelligence is a result of interaction of an individual and environment. (Hamachek, 1995).

Included in Piaget's observations was the concept that young children reason from concrete parts to whole terms while older children (post 11 or 12 years) consider hypotheses and reason from the more abstract whole to parts.

B.F. Skinner, in his observations, concentrated on the way environment affects learning. He recorded direct behavioral changes based on environmental rewards and punishments. One of his conclusions was that learning, as measured by specific observable change, is effected through positive reinforcement. (Hamachek, 1995).

In 1980, Noam Chomsky (cited in Gardner, 1989) endorsed the belief that innate capabilities are activated through the individual's experiences. Gardner, (1991) reflecting on Chomsky states:

> One ought to describe knowledge systems per se, figure out how much knowledge has to be built into an organism's nervous system in order for that organism to acquire these systems of knowledge, then locate the triggering circumstances

under which such knowledge can make its appearance.

(Gardner, 1991, p. 33)

In 1967, Eric Lenneberg, a protégé of Chomsky, made the following observations: 1) Language capabilities are located in certain regions of the left cerebral hemisphere and 2) Many linguistic functions were directly mediated by a genetic timetable. (cited in Gardner, 1991, p. 35). Gardner remarks about Lenneberg's research. Perhaps for the first time it became widely recognized that domains of knowledge exhibited their own rules and principles and that these might be attributed in some concrete detail to structures and mechanisms in the brain. (Gardner, 1991, p. 35).

As with any theory in education, one has to be careful not to think that Gardner's theory is all encompassing. The lessons that were learned from New Math and New Physics are just two examples. (Osburg, 1995).

When writing a review of Gardner's book, Multiple Intelligences: The Theory in Practice, (Mitchell, R. 1994), Ruth Mitchell criticizes the book for not being well focused. She also notes that Gardner and his associates seem less aware of practical issues or educational politics. She feels Gardner needs to focus on more practical ideas.

It does, however, seem logical that a curriculum that takes into account how the brain learns would best be served by using Gardner's Theory of Multiple Intelligences. Many schools across the country have adopted Gardner's theory. The following are brief descriptions of several of these schools.

Key School, an Indianapolis inner-city elementary school, was one of the first to conform to Gardner's theory. The students learn the basic skills of reading, writing, and

arithmetic, as well as take classes in computers, fine arts, foreign languages, and physical education. What is unique about Key School is that the students create three major projects in the arts each year. It is through these projects that they learn to develop and use their Multiple Intelligences. (Chapman, 1993)

A visit to Key School prompted Thomas Hoerr, Director of the New City School in St. Louis, to explore using Multiple Intelligences. Hoerr describes the steps the school undertook to implement this. The faculty began by reading Gardner's Frames of Mind. (1983). They moved on to how Multiple Intelligences could be used in the school and the steps needed to carry this out. The teachers assess students' portfolios, progress reports, profiles, genuine understanding, and standardized tests. (Hoerr, 1994).

The Arts PROPEL is a combined effort of Harvard Project Zero, the Educational Testing Service, and Pittsburgh Public Schools. In "Multiple Intelligences Theory: Creating the Thoughtful Classroom," (1993) White, Blythe, and Gardner describe how portfolios are built over time. These document the process that students use as a form of assessment instead of just grading the finished project. This process folio is used by teachers to evaluate development of skills, including inventiveness, expressiveness, self-assessment, use of criticism, and the ability to work independently and collaboratively.

The Howland School of the Arts, an inner city Chicago elementary school, uses the Theory of Multiple Intelligences as its base to focus on the visual and performing arts. Learning experiences are developed from holistic units of study and the performances and productions are the goals.

The schools cited above are examples of how curriculum can be directed by the Theory of Multiple Intelligences. It would seem, therefore, beneficial to incorporate the multiple intelligences into the traditional classroom setting with increased student achievement being the expected outcome.

Project Objective and Processes

As a result of teaching with the Theory of Multiple Intelligences during the period of September, 1996, to January, 1997, students of the targeted schools will show an increase in academic achievement as measured by authentic assessment techniques, publisher-made tests of curricular content, and project products.

In order to produce a measurable growth in student academic achievement, the following processes are necessary:

- Teaching students how to develop and use their Multiple Intelligences.
- Implementation of lesson plans that will incorporate the Multiple Intelligences Theory.
- Creating relevant projects that address the Multiple Intelligences Theory in the subject areas of language arts, math, science, and foreign language.

Project Action Plan

WHO: Kathy Coleman, Sheila Johnson, Linda Murray, Lorraine Pawlicki, Pam Peters and Rosalie Wemple.

WHAT: Lessons taught with a Multiple Intelligences application.

TO WHOM: Primary and secondary school students.

WHERE: Sites A, B, C, D, and E.

WHY: To decrease the discrepancies within the levels of achievement.

HOW: Through the use of strategies such as think-pair-share, cooperative grouping, music (singing, CD's), bodily expression (dance, pantomime), art (painting, sculpture), graphic organizers (Venn diagrams, web charts), manipulatives, metacognitive processing (PMI, Mrs. Potter's questions), self-reflection (log, journals), and projects.

WHEN: September 3 through September 30

1. Obtain parental permission for research participation.
2. Send out parent/guardian copy of Multiple Intelligences Checklist.
3. Distribute teacher surveys and conduct interviews.
4. Administer Multiple Intelligences Checklist to students.
5. Teach Multiple Intelligences strategies to students.

October 1 through November 30

1. Application of lesson plans - Curriculum based units will be developed to incorporate the Multiple Intelligences Theory.

December 1 through mid-January

1. Assessment and evaluation.

Methods of Assessment

In order to determine the effects of the planned intervention, student mastery of content area and project products will be assessed through the use of scales, paper and pencil tests, interviews and portfolios.

CHAPTER 4

PROJECT RESULTS

Historical Description of Intervention

The objective of this project was to decrease the gap in achievement levels among primary and secondary level students. The implementation was the use of the Multiple Intelligences approach to teach curricular goals. Original plans called for each primary and secondary teacher to plan and execute curricular goals using Multiple Intelligences.

To better explain the intervention, this project will be broken into two parts. Part A will illustrate the use of Multiple Intelligences techniques at the primary level, and Part B will illustrate them at the secondary level.

Part A Primary Intervention

The researchers at school A, B, and E carried out all the components of the proposed solution strategy. They combined their efforts and used the same surveys, tests, interviews, and teaching unit. Figures one, two, and three explain the results of the parent, teacher, and student surveys.

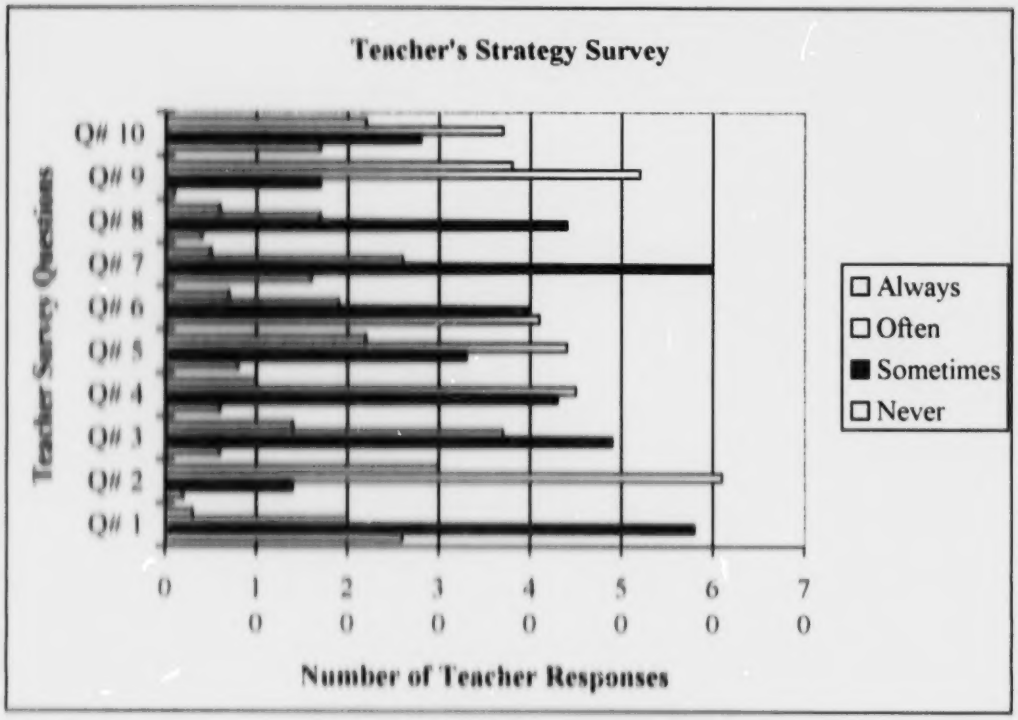

Figure 1 - Answers to Teacher's Strategy Survey Questions

In order to gain an insight into the teaching techniques employed at the researched schools, the Teacher's Strategy Survey was administered. Questions one through four cover the following strategies:

Q1 - Straight lecture

Q2 - Lecture with visual aids

Q3 - Teacher directed in-seat work

Q4 - Cooperative grouping

Questions five through ten incorporate teaching with the following intelligences:

Q5 - Verbal/Linguistic

Q6 - Musical/Rhythmic

Q7 - Visual/Spatial

Q8 - Bodily/Kinesthetic

Q9 - Interpersonal

Q10 - Intrapersonal

What stands out in this survey is that responses in the "sometimes" and "often" categories outweigh the "never" and "always" categories. Musical expression is the strategy with the most responses in the "never" category. Also evident is the high number of teachers who "sometimes" or "often" use straight lecture, lecture with video aides, and artistic expression. Teacher directed in-seat work, cooperative learning, verbal linguistic expression, and whole class discussion are used more than was anticipated. Student self-reflection is the most evenly distributed. (see Appendix B)

Personal Teaching Experience

A survey was conducted on Personal Teaching Experience. A sample of this survey can be found in Appendix D. The purpose of the Personal Teaching Experience Survey was to gain an insight into what teachers felt affected student achievement in their classroom.

The average teaching experience of the teachers surveyed was fifteen years. The response to styles of teaching was closely split between traditional (52%) and progressive (47%). The remaining percentage responded that they were both.

The vast majority of the teachers (92%) felt that they had seen a change in student achievement during their teaching careers.

All of the choices to question five of the survey under "yes" were qualified as contributors to the change in student achievement

It should be noted that the three main contributors to change in student achievement, according to the survey, were classroom behavior, student cooperation, and parent involvement

The areas that least affected change in achievement, according to the survey, were administrative policy and curriculum mandates

It seems interesting to note that the most important contributors were Interpersonal and the least important were Intrapersonal.

Parents and students were asked to respond to a Multiple Intelligences Checklist in order to assess their perception of their child. Examples of these checklists can be found in Appendices A and E.

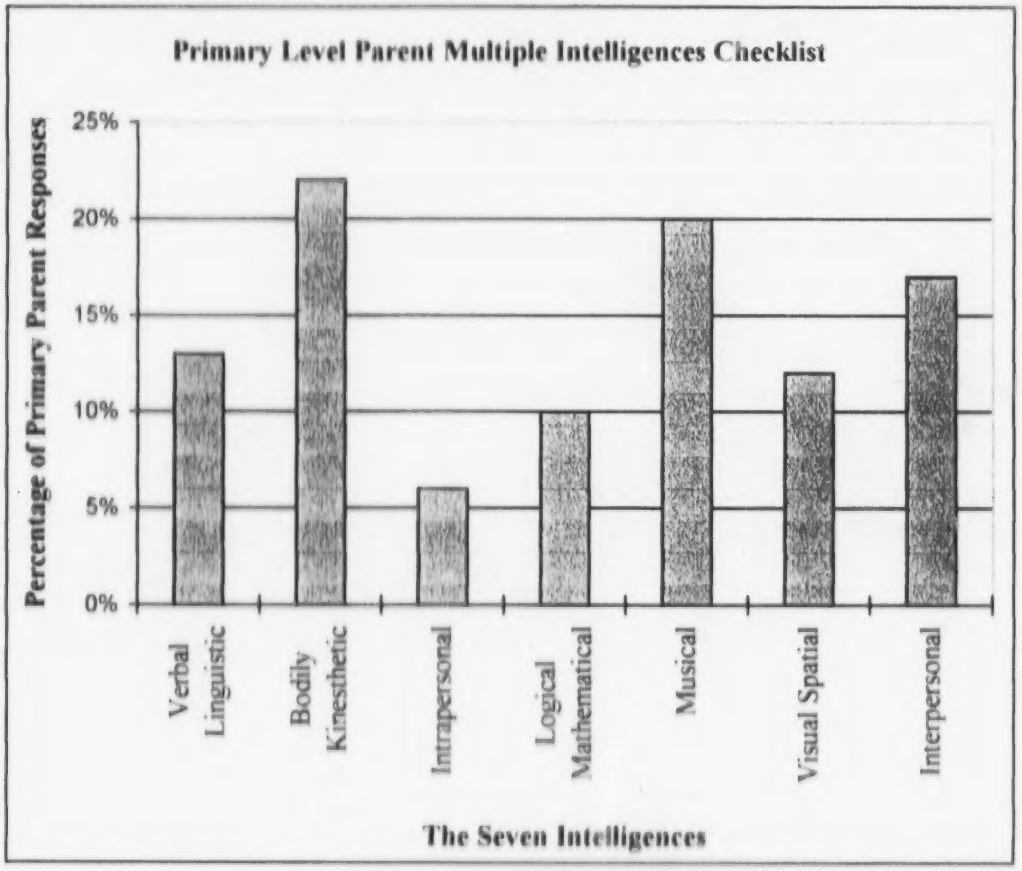

Figure 2 - Primary Level Parents' Perceptions of Their Children's Intelligences

In order to assess the parents' level of understanding of their children, a Multiple Intelligences Checklist was sent home to each parent. (See Appendix A) They were asked to check the behaviors that they noticed in their children. This data was tallied and presented in Figure 2. This information was very helpful in that there was a strong correlation between the parents' responses and the children's responses.

Age was a possible explanation for the closeness of the responses. Children at the primary level are naturally more dependent on their parents than children at the junior high or high school levels. Of the seven intelligences, Bodily/Kinesthetic had the strongest response

from both the parents and children. The Musical Intelligence was second. Verbal/Linguistic and Interpersonal were third and fourth. It is interesting to note that the parents' data showed Visual/Spatial as fifth, but the children's data reported it seventh. Logical/Mathematical was ranked sixth for both.

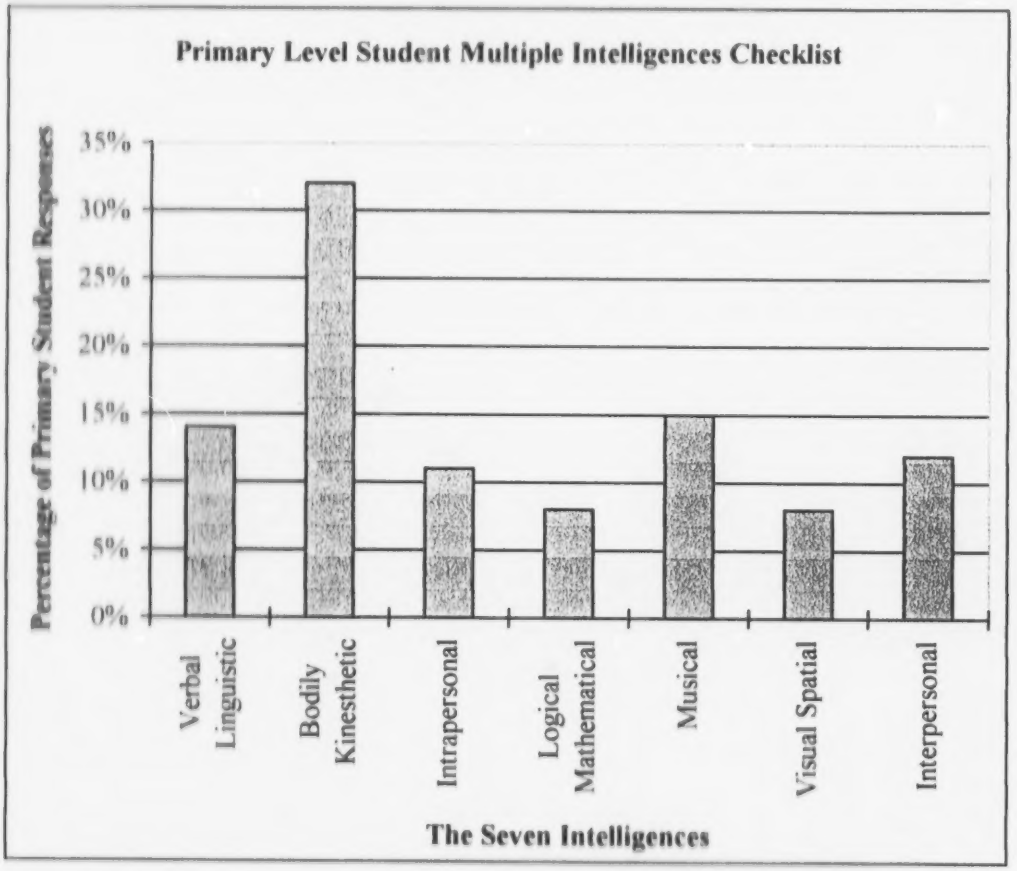

Figure 3 - Primary Level Students' Perceptions of Their Intelligences

To better understand the children's view of their own intelligences, a Primary Student Multiple Intelligences Checklist was given. (See Appendix E) As evident in figure 3 the choices for Bodily Kinesthetic were the strongest. This reflects that primary

children see themselves as being comfortable using their bodies to relate to and learn about the world around them.

In comparing Figures 2 and 3, it should be noted that both parents' and children's responses were similar.

After assessing the surveys and interview results taken during the first two weeks of school the researchers took the following steps of intervention.

An eight day unit on Multiple Intelligences and an introduction to cooperative learning and working in groups was taught first. Each intelligence was explained and many activities promoted the idea that every person is smart in his own way. The children became aware of their strong intelligences and that success can be achieved through working together.

The next step in the intervention involved teaching to a specific skill area using Multiple Intelligences strategies. This intervention lasted ten weeks.

The skill area selected was recognition and identification of capital and small letters at the kindergarten and first grade level. Each class of children was given instruction throughout the school day on the targeted skills. Care was taken to include lessons which stressed all the intelligences, but extra attention was paid to the Musical, Kinesthetic, and Interpersonal intelligences because these were the class strengths according to the student and parent surveys. (See Figures 2 and 3)

The alphabet as a whole, as well as the individual capital and small letters, had to be considered as the intervention progressed. At least an hour to an hour and a half a day was spent doing alphabet activities in school A and B. These activities were intertwined

during the day with other curriculum demands. Whenever possible, the lessons were integrated with other subjects and their units. At school E the teacher implemented the same intervention, but the class structure was different. It was a State Title 1 pull-out program. The class met for forty-five minutes each day. This time was spent on alphabet activities, with Fridays set aside for centers.

Each teacher used the required reading program at their specific school as a frame work. The activities that were used for this intervention were in addition to the activities presented in these basal programs.

In the following section we provide at least one example of how a particular intelligence was utilized, and a reference to an appendix where a complete listing of interventions is found.

As the alphabet unit progressed and each intelligence was addressed, it became apparent that no matter what intelligence was targeted, it also fell into the intelligences of Interpersonal, working in a group or Intrapersonal, working alone. As the reader progresses through this intervention, this should be kept in mind.

Interpersonal Intelligence

The Interpersonal intelligence was targeted whenever cooperative groups were used. The students also were paired with a "Study Buddy", to practice letter recognition every day. This was achieved through alphabet games and flash cards. (A listing of Interpersonal activities can be found in Appendix H.)

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Intrapersonal Intelligence

Intrapersonal skills were addressed by giving children the opportunity to practice writing letters, searching for letters on printed pages, computer activities, looking at books, and being assessed using flash cards. (A listing of Intrapersonal activities can be found in Appendix I.)

Bodily/Kinesthetic Intelligence

To develop the Bodily/Kinesthetic intelligence, the children were exposed to many activities daily. This was a strong intelligence for this primary group and teaching to this intelligence proved to be the most enjoyable for the children.

Wall cards with the capital and lower case letters on them, as well as an initial sound and picture, were displayed prominently across a wall. The children would chant the letter, say the picture and sound of the letter and use body movements that related to the picture. An example would be:

"Capital A, lower case a, lamb aaa."

The children would pretend to cradle a lamb and pet its head while saying the sound.

A new letter was introduced each day. The children became very animated and tried to outdo each other while they chanted. The repetition of this activity seemed to imprint the letters into the child's mind. During assessment, if a child had trouble remembering the letter, he would start to do the chant and the letter was usually recalled. Another by-product of this activity was that initial sounds were also learned.

A game using body movements associated with beginning letter sounds was very popular with the children. The teacher would hold up a letter and say its name and the children would act out actions or animals that began with that letter. An example of this activity would be:

Letter g, a grasshopper hops, gallop, groan, walk like a gorilla and wave good-bye to g.

Whenever a letter was introduced, the children were put into small groups to lie on the floor and form the letter using their bodies. This was an excellent activity that promoted cooperation as well as an ability to think out how each letter is formed. Follow up lessons would allow each group to form a letter of their choice and the class would try to recognize it.

Whenever the tables in the classroom needed to be cleaned, the teacher would squirt shaving cream on them and let the children form letters. This activity was so popular that the children would beg to keep forming letters. The formations could be stressed over and over.

A running game called "Scram" was used for daily practice. The children would line up and the teacher would show a letter. The child would say the letter if they recognized it; if not, the teacher would say the letter and say "scram!" The child would then run to the end of the line and the process would continue. This activity was one that could be done outside as well. After about five minutes of playing the game, children could play on the playground. It was a great activity for warming up before exercise.

Mats were made of plastic with alphabet letters on them. The children would throw a bean bag on a letter and name that letter. (A listing of Bodily/Kinesthetic activities can be found in Appendix J.)

Verbal/Linguistic Intelligence

The Verbal/Linguistic intelligence was addressed using various activities.

As each letter was introduced, a chart story was done. Each child had his own copy of the story. The story had words that began with the targeted letter. The children would use highlighters to color the targeted letter. They would also listen as the teacher told the story. A brainstorming session was held after each story to list words that began with the targeted letter. These stories can be found in the book Alphabet Stories, by Jill M. Coudron. The stories are humorous and engage a young child's interest.

Class books were made from familiar alphabet songs. These books were illustrated using photographs, children's drawings, and pictures found in magazines. The books were circulated to each child's home. Because of the many positive comments received about these delightful books, it was evident that this activity was enjoyed by each child's family. The books also gave the children a feeling of ownership and a sense of accomplishment. They were later read over and over in the class library corner.

Each alphabet letter was made into a book. The letter and pictures beginning with that letter were used. (A listing of Verbal/Linguistic activities can be found in Appendix K.)

Logical/Mathematical

The Logical/Mathematical intelligence was reinforced with activities that promoted patterning, sequencing, and classifying.

Alphabet letters were stamped or written in patterns. An example of a pattern might be "cddcddcddc". The pattern would repeat the letters that were being stressed at that point in time.

Alphabet letters were classified into capital and lower case, curved, straight lined, or both. Venn diagrams were used to illustrate these activities. (A list of Logical/Mathematical activities can be found in Appendix L.)

Musical/Rhythmic Intelligence

The Musical/Rhythmic intelligence was addressed in many ways and repeated several times during the day. These activities were used as energizers and for transition during the day.

Alphabet chants were made up for special times of the year or specific topics. An example of one of these chants is as follows:

A, B, C, D, E

A monster can scare me.

F, G, H, I, J

Ghosts just like to play.

K, L, M, N, O

Halloween is scary, no, no, no!

P, Q, R, S, T

Trick or treat is great for me

U, V, W, X, Y, Z

It's great getting candy for free

The chants were written with the teacher's help. The children participated in and enjoyed each chant they helped to write. The words of the chant were displayed, and it was recited over and over.

When certain letters were introduced, the children would make or play on a real instrument that began with the letter's sound. Examples of these are bongos for "b", drums for "d", maracas for "m", and flutes for "f". The children used their instruments to accompany the alphabet chants. (A listing of Musical/Rhythmic activities can be found in Appendix M.)

Visual/Spatial Intelligence

To develop the Visual/Spatial intelligence, activities that helped form mental models of each letter were used. A system of teaching printing and letter formation was one that taught the children each letter's formation using a color code of purple and green. The first stroke used in forming the letter was made in the color purple and the second in green. This system helped to avoid letter reversals. The children were able to refer to an alphabet chart that had each letter written in the purple and green color code. They were then able to print the letter correctly.

Letter formation was also practiced using small boxes that were lined with blue contact paper. A fine layer of sand was put into each box. The children were able to practice printing letters with their fingers in the sand. Freezer bags filled with hair setting

gel and individual chalkboards were also used to encourage correct formation of letters. These activities were embraced by the children with more enthusiasm than mundane printing practice on paper. When given a choice of printing materials, the children never chose pencil and paper. (A listing of activities for Visual/Spatial can be found in Appendix N.)

Conclusion

The activities that taught the alphabet using the Multiple Intelligences created active and enthusiastic classrooms. The researchers found that they made some changes in their teaching methods. Before this intervention, they chose lessons that were strong in their own intelligences. This intervention made the researchers teach to the intelligences of their students. The results of the assessment show that teaching to the intelligences of their students was more conducive to learning.

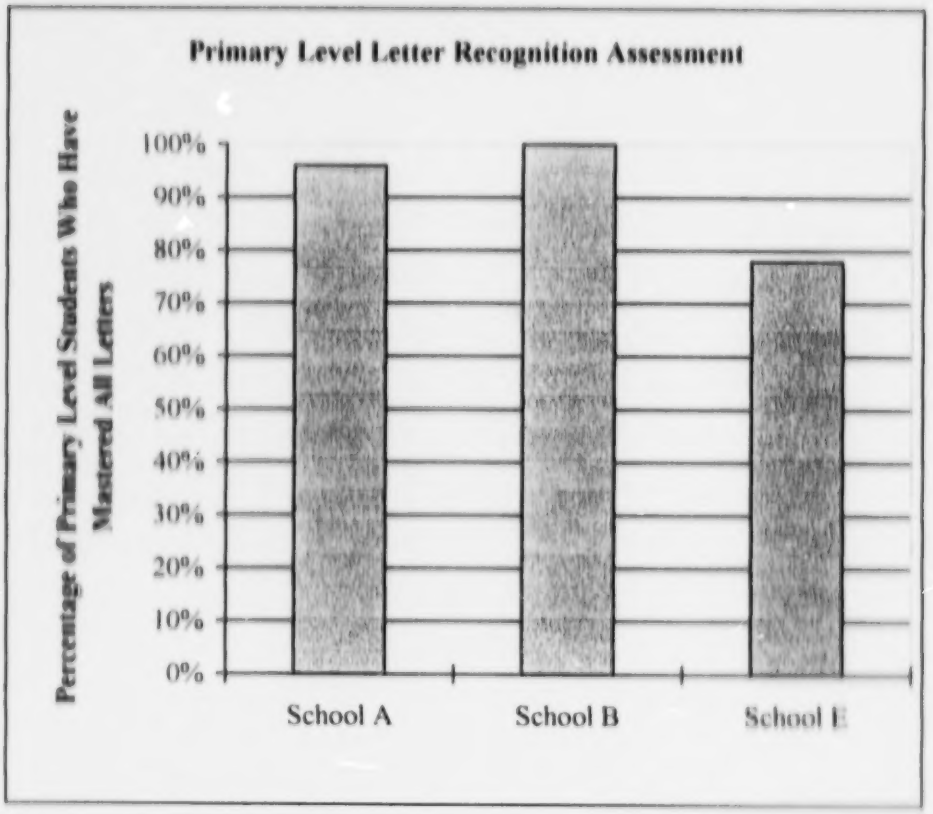


Figure 1 - Primary Level Letter Recognition Assessment Results

Assessment after the intervention was a simple flashcard recognition of capital and small letters. The results of each class from school A, B, and E are demonstrated in Figure 4.

Observations of the Action Research at the Primary Level

School A:

The students at School A achieved an alphabet recognition mastery level of 96%. This success was due in part to parental reinforcement, daily in-school practice, and work in cooperative groups. Teaching with the Multiple Intelligences addressed the students'

varied learning strengths, and as a result, the children demonstrated a spirited eagerness to learn that permeated the classroom.

School B:

The results of the assessment at School B were 100% mastery of alphabet recognition. These results include a student with an IQ of 62. Influencing these findings were careful planning and implementation of lessons taught to the Multiple Intelligences and parental support with drills and practices at home. Learned cooperative skills, appropriate class behavior and class pride supported this 100% mastery.

School E:

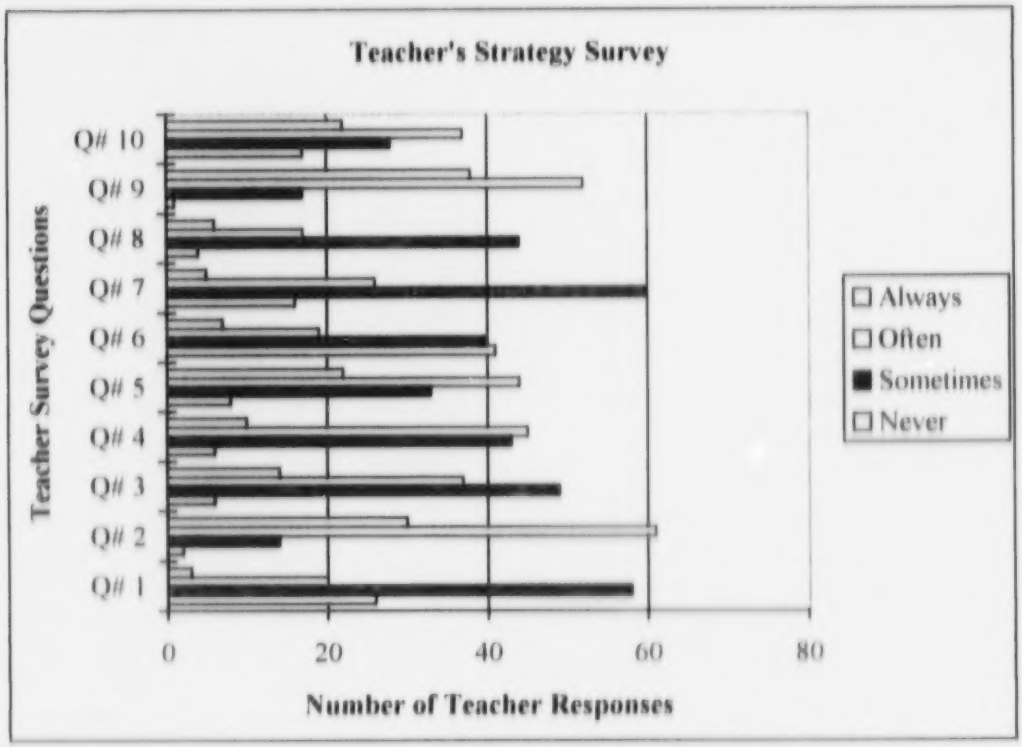
The results of the assessment at School E was seventy-eight percent mastery of letter recognition. This was successful for this group of children considering the fact they were identified "at risk," and their time with the teacher was limited to forty-five minutes each day.

Learning cooperative methods enhanced their ability to achieve and experience success while they moved about in their groups. This teaching method reinforce the Bodily/Kinesthetic Intelligence and encouraged a high interest level among the children.

CHAPTER 4

PART B SECONDARY INTERVENTION

This section involves students at the secondary level. Two sets of students were contained in School C while the third set was contained in School D. The same surveys, tests, and interviews were administered, and the results can be found in Figures One, Four, and Five.



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What stands out in the Teacher's Strategy Survey (Figure 1) is that responses in the "sometimes" and "often" categories outweigh the "never" and "always" categories. Musical expression is the strategy with the most responses in the "never" category. Also evident is the high number of teachers who "sometimes" or "often" use straight lecture, lecture with visual aids, and artistic expression. Teacher directed in-seat work, cooperative learning, verbal/linguistic expression, and whole class discussion are used more than was anticipated. Student self-reflection is the most evenly distributed. (Appendix B).

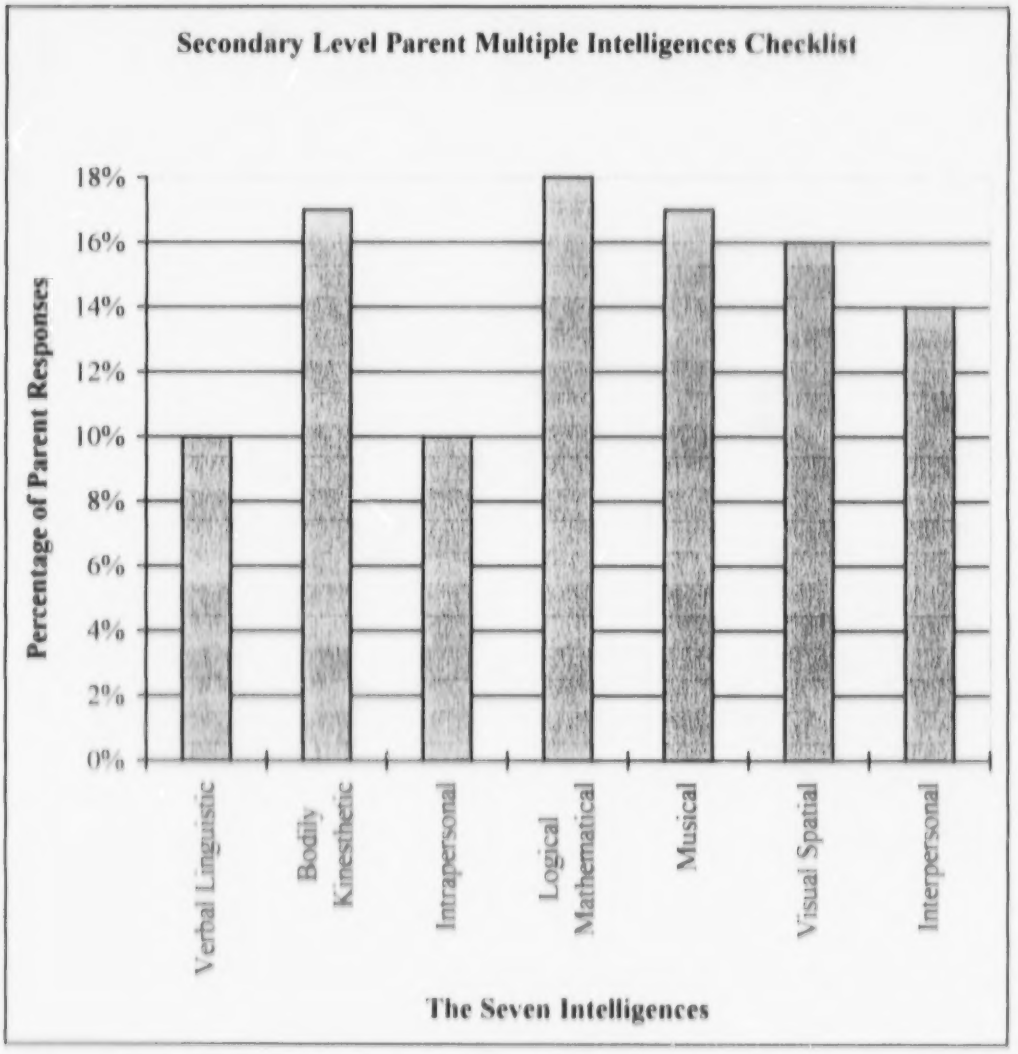

Figure 5 - Secondary Level Parents' Perceptions of Their Children's Intelligences

Figure 5 indicates that the parents saw their children's strengths as Logical/Mathematical, Bodily/Kinesthetic, Musical/Rhythmic, with Visual/Spatial and Interpersonal following closely behind. The least noted intelligences were Intrapersonal and Verbal/Linguistic. It is noteworthy that School C parents perceived their children to be strongest in the Logical/Mathematical intelligence. However, School D parents perceived their children to

be strongest in the Interpersonal intelligence and rated Logical/Mathematical as sixth out of the seven intelligences.

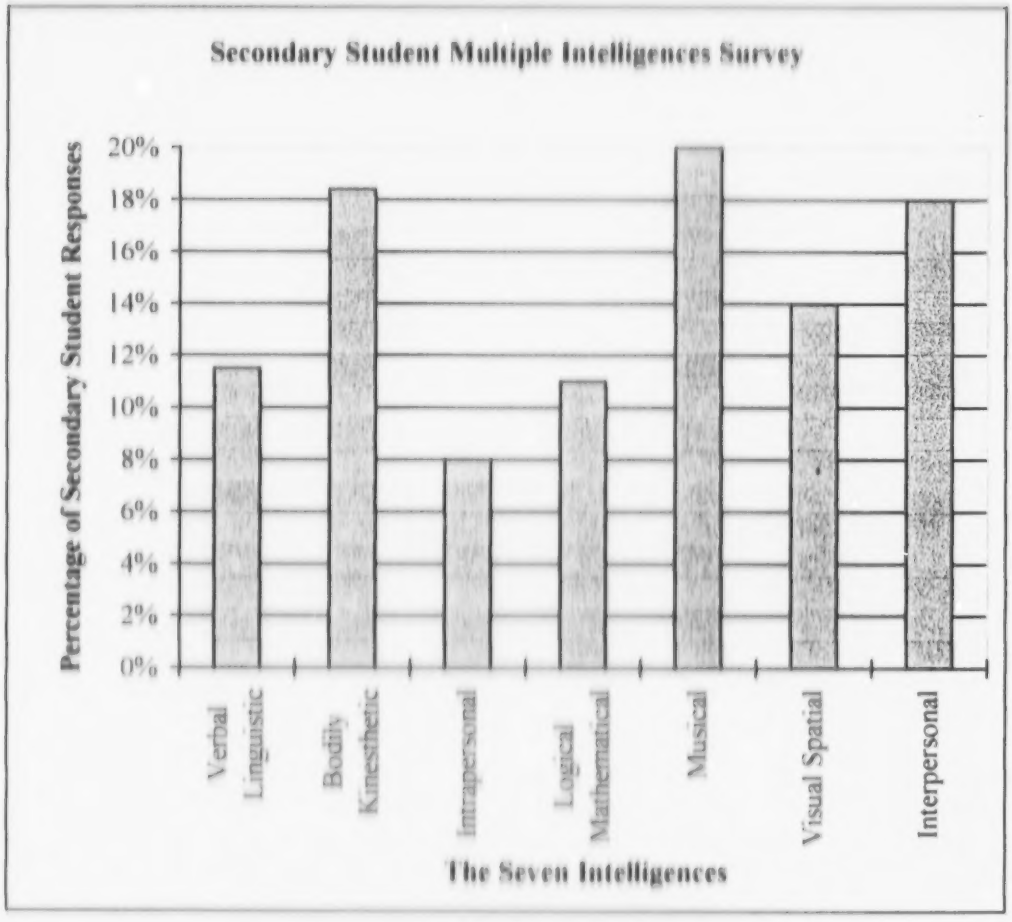

Figure 6 - Secondary Level Students' Perceptions of Their Intelligences

Figure 6 indicates that the students of Schools C and D perceived themselves as strongest in the Musical/Rhythmic, Interpersonal, and Bodily/Kinesthetic Intelligences. Visual/Spatial follows with Verbal/Linguistic and Logical/Mathematical tied. The students perceived the Intrapersonal Intelligence as their least developed. It is noteworthy that School C parents saw their children's strengths differently from the way the students saw

themselves. For the Parent Survey, the top three findings were Logical/Mathematical, Musical/Rhythmic and Bodily/Kinesthetic (tied), and Interpersonal. The Student Survey, however, showed Musical/Rhythmic, Bodily/Kinesthetic and Interpersonal (tied), and Visual/Spatial. On the other hand, School D parents perceived the strengths of their children's Multiple Intelligences in almost the same way as the students perceived themselves. The top three intelligences were: Interpersonal, Musical/Rhythmic, and Bodily/Kinesthetic.

The action research at Schools C and D began in September of 1996, and was completed by mid-January, 1997. After obtaining permission from the parents for the research, the teachers requested that each parent fill out a Multiple Intelligences Survey. (See Appendix A) Each student did likewise. (See Appendix G).

After evaluating these pieces of information, the variety of students' intelligences became apparent. The students were grouped heterogeneously by varied ability levels.

Each teacher began with a class presentation, explanation, follow-up activities, and tips to enhance each of the seven intelligences. A curriculum unit and lessons were then taught using Multiple Intelligences.

The lessons taught at School C included a study of Edgar Allen Poe and a study of Plant Adaptations.

The lesson objectives in the study of Edgar Allen Poe were to foster a better understanding of the author. The curricular concepts of a story's beginning, middle and end, predictions, plot, rhyme patterns, rhythm, mood, setting, vocabulary, and sentence patterning were taught using Multiple Intelligences' techniques. The students worked on

the unit through the use of selected copied materials, listening to tapes, oral and silent reading selections, viewing animated videos, movies, and a field trip to a live theater production. To begin the study, the targeted student group completed a KWL form about Edgar Allen Poe. Students were orally presented with a list of Edgar Allen Poe works to be studied and a criterion for activities to be accomplished during the specified time. These activities varied by individual, paired, and group work. The end result of this unit was a paper and pencil test on curricular concepts demonstrating knowledge of the author and his works.

One of the most active days during this unit was the day of the vocabulary quiz. The students were directed to choose a partner and one was to come up for two index cards. On one of the index cards, they would write a vocabulary word, and on the other card, they would write the definition of the word. After each word and definition had been placed on cards, we collected them, shuffled them, and taped one card on each student's back. Without talking to each other, they had to match up their vocabulary word with the correct definition. Once they found their mate, they sat side-by-side in a row so that everyone could see the pairs. Since they viewed themselves as strongly Bodily/Kinesthetic, this way of vocabulary testing was a big hit.

Another popular activity was tapping out the rhythm or beat of a poem. Musical/Rhythmic was perceived as the strongest intelligence of our students; and from this exercise, it was the one they could identify with most easily. Whether they used a small drum from the music teacher, tapped a pencil on the desk top, or just clapped out the beat, they liked this exercise and mastered an element of poetry at the same time.

These two examples of teaching with Multiple Intelligences increased the students' motivation to participate in curricular defined learning skills. By varying the intelligences, more students took an active part in their learning. It was discovered that with just a little extra effort, teaching with the Multiple Intelligences was rewarding for both the student and the teacher.

The lesson objectives in the study of Plant Adaptations were to allow students to learn how plants can adapt to their natural environments when given a predetermined set of information including temperature, predators, soil conditions, exposure to sunlight, rainfall, and other conditions. At the beginning of the unit on Monerans, students were given an opportunity to use their Intrapersonal intelligence by journaling their knowledge of plants. Background information was later provided to students through the use of overhead projections, slides, lectures, and research concerning factors of plant growth, structure, reproduction, and adaptation to the environment.

The Interpersonal and Visual /Spatial intelligences were utilized when groups were given a separate and unique set of criteria relating to plant production. In the beginning, each group was given an explanation of what they were expected to do. They designed a cover for their folder that contained important information relating to their group project.

Next they were given a chart that became the list for organizing their ideas. This chart helped the students research criteria which closely reflected their own thoughts. The students used information obtained from the classroom, library, computers, and the internet. This Logical/Mathematical approach helped them to decide how their plant should look .

The students were required to draw and describe their plants and its environment. As they worked on this, they listened to classical music. When the projects were completed, they journaled their reflections.

. Finally, students had to communicate their reasoning and defend their plant's adaptations to their peers. They did this through oral and visual class presentations. What was rewarding was that two students who usually have a difficult time working, especially in groups, turned in an excellent project.

The lesson objectives taught in Basic Conversational Spanish were inquiries and responses, greetings and good-bye's, titles of people, numbers, days, months, dates, weather, seasons, time, colors, animals, the expression of likes/dislikes, emotional/physical conditions, and grammar. These areas were taught with and assessed by the foreign language goals of students' attaining listening, speaking, reading, and writing skills as well as an awareness of Hispanic countries, peoples, and culture.

Foreign language readily lends itself to teaching with the Multiple Intelligences. It is automatically Verbal/Linguistic, Logical/Mathematical, and Interpersonal because of vocabulary, sentence structure, and conversation. For most students of the first and second year, it can be likened to learning about the English language at the primary level of their education. Since the surveys at the high school level (School D) indicated that students perceived themselves strongest in the Musical/Rhythmic, Interpersonal, and Bodily/Kinesthetic intelligences, lessons were developed to address these three.

A popular lesson was learning the vowel sounds in Spanish. The students were asked to sing them to "The Witchdoctor Song" by the Chipmunks. The vowel sounds

were also acted out using interjections. At first this evoked student laughter, but with a little practice, they gave award-winning Intrapersonal performances.

Another popular lesson was playing Pictionary at the board in order to make reviewing vocabulary more fun. Vocabulary words were written on separate strips of paper (one for each student) and placed them into a container. Each student chose a vocabulary word and was asked to keep it a secret. The next day, the students joined their different learning groups and as a group, they had to agree upon the vocabulary word that a student from a different group was drawing on the board. Each member of each group received as many extra credit points as the whole group acquired with correctly written answers in Spanish. This lesson incorporated the Verbal/Linguistic, Interpersonal, Visual/Spatial, and Bodily/Kinesthetic intelligences.

The students preferred grouping, moving about, singing or listening to songs, and expressing themselves artistically. Most of all, they enjoyed what could have been perceived as pure drudgery. They liked working on a specially assigned cultural project that involved jigsawing responsibilities within their particular groups, making oral presentations, and creating hand-made artifacts. Some have even asked for more projects.

A complete list of Secondary Multiple Intelligences Activities can be found in Appendices O, P, Q, R, S, T, and U.

Observations of the Action Research at the Secondary Level

It was found that teaching to the Multiple Intelligences made the classes not only more interesting and relevant to the students, but also to the teachers. Comments from both the students and parents were favorable. The teachers involved felt gratified by the

compliments they received from their colleagues. Finally, the researched students showed an overall improvement in their academic achievement. What is significant is that at semester's end, less than 6% were below average in their curriculum work.

Conclusions of the Action Research Project

As a result of our work in this action research project, we feel this educational philosophy is credible and worthy of an educator's endeavor. In support of Multiple Intelligences, we found that:

- It lends itself to the developmental stages of the primary child and the psychology of the adolescent.
- It provides students' ownership while meeting their needs and enlivening their interest.
- It enhances all aspects of teaching, especially self-assessment and evaluation.
- It gives classroom activity meaning and authenticity.
- It enhances parents' knowledge of how their child learns.
- It promotes tolerance through knowledge of different learning modalities.
- It creates an awareness of the teacher's learning strengths and preferences and enables each teacher's strategies to complement the students' learning strengths.

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Appendices

Appendix A
Parent Multiple Intelligences Checklist

Check those statements that apply to your child_____:

1. _____ Books are very important to my child.
2. _____ My child engages in at least one sport/physical activity on a regular basis.
3. _____ My child can easily compute numbers in his head.
4. _____ My child regularly spends time alone meditating, reflecting, or thinking about important life questions.
5. _____ My child finds it difficult to sit still for long periods of time.
6. _____ My child has a pleasant singing voice.
7. _____ My child can hear words in his head before he reads, speaks, or writes them down.
8. _____ My child gets more out of listening to the radio or in audio cassette then he does from television and film.
9. _____ My child attends counseling sessions or personal growth seminars to learn more about himself.
10. _____ My child can tell when music is off key.
11. _____ My child enjoys playing games or solving brain teasers that require logical thinking.
12. _____ My child likes working at hands-on activities such as sewing, weaving, carving, carpentry, or model-building.
13. _____ My child shows in aptitude for word games such as Scrabble, Anagrams, or Password.
14. _____ My child would rather spend evenings at lively social gathering than stay at home alone.
15. _____ My child's best ideas often come to him when he is out for a long walk or a jog, or when he is engaged in some other kind of physical activity.
16. _____ My child frequently listens to music on a radio, records, cassettes, or compact discs.
17. _____ My child has a opinions that set him apart from the crowd.
18. _____ My child enjoys entertaining others with tongue twisters, nonsense rhymes, or puns.
19. _____ My child likes to set up little "what if" experiments (e.g. "What if I double the amount of water I give to my rosebush each week?")
20. _____ My child prefers looking at reading material that is heavily illustrated.
21. _____ My child often likes to spend his free time outdoors.
22. _____ My child likes to get involved in social activities connected with his work, church, or community.
23. _____ My child has a special hobby or interest that he keeps to himself.
24. _____ My child plays a musical instrument.
25. _____ My child feels comfortable in a crowd.
26. _____ My child knows the tunes to many different songs or musical pieces.

27. _____ My child's mind searches for patterns, regularities, or logical sequences in things.
28. _____ My child has some important goals for his life that he thinks about on a regular basis.
29. _____ My child has vivid dreams at night.
30. _____ My child likes to draw or doodle.
31. _____ My child considers himself a leader (or others have called him that).
32. _____ My child enjoys the challenge of teaching someone else what he knows how to do.
33. _____ My child found geometry easier than algebra in school.
34. _____ My child is interested in new developments at science at school.
35. _____ My child can generally find his way around unfamiliar territory.

Appendix B
Teacher's Strategy Survey

The following is a survey of the frequency with which certain teaching strategies are used. Please consider each item carefully and circle the number that applies to you and your classroom. All information will be kept confidential.

SCALE: 0=Never 1=Sometimes 2=Often 3=Always

Teaching Strategies

1.	Straight lecture	0123
2.	Lecture with visual aids (graphic organizers, overheads, videos, chalkboards)	0123
3.	Teacher directed individual in-seat work	0123
4.	Cooperative grouping	0123
5.	Verbal/Linguistic expression (silent reading, oral recitations, students' writing)	0123
6.	Musical expression (singing, playing instruments, radios, CD's)	0123
7.	Artistic expression (drawings, paintings, sculptures)	0123
8.	Bodily expression (pantomime, charades, dance, exercise)	0123
9.	Whole-class discussion (processing information)	0123
10.	Student self-reflection (logs, journals, assessment)	0123

Thank you for your cooperation,

Please return by _____

Appendix C
Teacher Interview Form

1. Do you feel that there is too much of a discrepancy in grades between your highest and lowest student achievers?

   yes_____ no_____

2. If yes, do you feel that this discrepancy is due to:

   a. intelligence levels _____
   b. motivation _____
   c. study skills _____
   d. home environment _____
   e. socio-economic conditions _____

3. If no, do you feel that:

   a. There always has been and always will be discrepancies _____
   b. There is nothing you can do about it _____

4. Do you feel that student achievement may also be related to:

   a. lesson content _____
   b. teacher presentation _____
   c. assessment technique _____
   d. student physical and emotional involvement _____

5. Do you feel that new ideas in teaching are worth considering?

   yes_____ no_____

6. If yes, would you be willing to attend workshops and seminars to employ these ideas in your classroom?

   yes_____ no_____

7. If no, do you feel that:

a. Your present teaching style is satisfactory. _____
b. What worked before should work now. _____
c. It is the student's responsibility to master the material presented. _____

Appendix D
Personal Teaching Experience Survey

1. Number of years teaching _____

2. Location _____

3. Style of teaching

   traditional _____
   progressive _____

4. Have you seen a change in student achievement in your teaching experience?

   Yes_____ No_____

5. If yes, have any of these areas affected the change in student achievement?

	Yes	No
classroom behavior	____	____
class participation	____	____
student cooperation	____	____
outside influence (peers, jobs)	____	____
technology	____	____
parent involvement	____	____
curriculum mandates	____	____
administrative policy	____	____
class size	____	____
time restrictions	____	____

Appendix E
Primary Multiple Intelligences Survey

Circle the child's preference.

Would you rather:

a. Have someone read you a story	Verbal/Linguistic, interpersonal
b. Dance to music	Musical/Rhythmic, intrapersonal
a. Listen to music	Musical/Rhythmic
b. Dance to music	Bodily/Kinesthetic
a. Put together a puzzle yourself	Intrapersonal
b. Put together a puzzle with a friend	Interpersonal
a. Count out materials for the teacher	Mathematical/Logical
b. Pass out materials for the teacher	Bodily/Kinesthetic
a. Draw a picture of a building	Visual/Spatial
b. Build a building with blocks	Bodily/Kinesthetic
a. Do a puppet show	Verbal/Linguistic
b. Draw a picture for a story	Visual/Spatial
a. Play a computer game	Mathematical/Logical
b. Ride your bike	Bodily/Kinesthetic

Tally results next to each intelligence.

1. Intrapersonal_____	2. Interpersonal_____
3. Mathematical/Logical____	4. Verbal/Linguistic_____
5. Bodily/Kinesthetic____	6. Visual/Spatial____
7. Musical/Rhythmic____	

The greater number of tallies indicates possible strengths in that intelligence.

Appendix F

Dear Parent/Guardian,

As part of my research study necessary for obtaining my Master's Degree from Saint Xavier University, I ask your support in filling out the attached survey. The results of this survey will be kept confidential. I would appreciate your returning it to me by

_____

Thanking you in advance for your cooperation, I remain

Sincerely yours,

Appendix G
Student Multiple Intelligences Checklist

Check those statements that apply:

1. ___ Books are very important to me.
2. ___ I engage in at least one sport or physical activity on a regular basis.
3. ___ I can easily compute numbers in my head.
4. ___ I regularly spend time alone meditating, reflecting or thinking about important life questions.
5. ___ I find it difficult to sit still for long periods of time.
6. ___ I have a pleasant singing voice.
7. ___ I can hear words in my head before I read, speak, or write them down.
8. ___ I get more out of listening to the radio or a spoken word cassette than I do from television or films.
9. ___ I have attended counseling sessions or personal growth seminars to learn more about myself.
10. ___ I can tell when a musical note is off-key.
11. ___ I enjoy playing games or solving brain teasers that require logical thinking.
12. ___ I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building.
13. ___ I show an aptitude for word games like Scrabble, Anagrams, or Password.
14. ___ I would rather spend my evenings at a lively social gathering than stay at home alone.
15. ___ My best ideas often come to me when I'm out for a long walk or a jog, or when I'm engaged in some other kind of physical activity.
16. ___ I frequently listen to music on radio, records, cassettes, or compact discs.
17. ___ I have opinions that set me apart from the crowd.
18. ___ I enjoy entertaining my self or others with tongue twisters, nonsense rhymes, or puns.
19. ___ I like to set up little "what if" experiments (for example, "What if I double the amount of water I give to my rosebush each week?").
20. ___ I prefer looking at reading material that is heavily illustrated.
21. ___ I often like to spend my free time outdoors.
22. ___ I like to get involved in social activities connected with my work, church, or community.
23. ___ I have a special hobby or interest that I keep pretty much to myself.
24. ___ Other people sometimes have to stop and ask me to explain the meaning of the words I use in my writing and speaking.
25. ___ I play a musical instrument.
26. ___ I feel comfortable in the midst of a crowd.
27. ___ I frequently use hand gestures or other forms of body language when conconversing with someone.
28. ___ English, social studies, and history were easier for me in school than math and science.

29. ___ My life would be poorer if there were no music in it.
30. ___ My mind searches for patterns, regularities, or logical sequences I things.
31. ___ When I drive down a freeway, I pay more attention to the words written on billboards than to the scenery.
32. ___ I have some important goals for my life that I think about on a regular basis.
33. ___ I can comfortably imagine how something might appear if it were looked down upon from directly above in a bird's-eye view.
34. ___ I have a realistic view of my strengths and weaknesses (borne out by feedback from other sources).
35. ___ I need to touch things in order to learn more about them.
36. ___ I like to draw or doodle.
37. ___ I consider myself a leader (or others have called me that).
38. ___ I sometimes catch myself walking down the street with a television jingle or other tune running through my mind.
39. ___ I enjoy daredevil amusement rides or similar thrilling physical experiences.
40. ___ I would prefer to spend a weekend alone in a cabin in the woods rather than at a fancy resort with lots of people around.
41. ___ I enjoy the challenge of teaching another person, or groups of people, what I know how to do.
42. ___ Geometry was easier for me than algebra in school.
43. ___ I can easily keep time to a piece of music with a simple percussion instrument.
44. ___ I'm interested in new developments in science.
45. ___ I believe that almost everything has a rational explanation.
46. ___ I would describe myself as well coordinated.
47. ___ I consider myself to be strong willed or independent minded.
48. ___ I can generally find my way around unfamiliar territory.
49. ___ My conversation includes frequent references to things that I've read or heard.
50. ___ I favor social pastimes such as Monopoly or bridge over individual recreations such as video games and solitaire.
51. ___ I've written something recently that I was particularly proud of or that earned me recognition from others.
52. ___ I keep a personal diary or journal to record the events of my inner life.
53. ___ I know the tunes to many different songs or musical pieces.
54. ___ I need to practice a new skill rather than simply reading about it or seeing a video that describes it.
55. ___ I have vivid dreams at night.
56. ___ I sometimes think in clear, abstract, wordless, imageless concepts.
57. ___ I frequently use a camera or camcorder to record what I see around me.
58. ___ I have at least three close friends.
59. ___ When I have a problem, I'm more likely to seek out another person for help than attempt to work it out on my own.
60. ___ Math and/or science were among my favorite subjects in school.
61. ___ I'm sensitive to color.
62. ___ I am self-employed or have at least thought seriously about starting my own business.

63. ___ If I hear a musical selection once or twice, I am usually able to sing it back fairly accurately.
64. ___ I enjoy doing jigsaw puzzles, mazes, and other visual puzzles.
65. ___ I like finding logical flaws in things that people say and do at home and work.
66. ___ I prefer group sports like badminton, volleyball, or softball to solo sports such as swimming and jogging.
67. ___ I feel more comfortable when something has been measured, categorized, analyzed, or quantified in some way.
68. ___ I often see clear visual images when I close my eyes.
69. ___ I often make tapping sounds or sing little melodies while working, studying, or learning something new.
70. ___ I'm the sort of person that people come to for advice and counsel at work or in my neighborhood.

Appendix H
Primary Interpersonal Activities

Interpersonal - Activities that encourage sensitivity and understanding toward others

1. Cooperative group work
2. Study buddies worked together to practice letters
3. Class Murals
4. Games that stress alphabet recognition

Appendix I
Primary Intrapersonal Activities

Intrapersonal - Activities that foster sensitivity to one's inner feelings, as well as knowing one's own strengths and weaknesses.

1. Computer activities
2. Worksheets
3. Self-directed center activities
4. Listening to cassette recordings
5. Creative writing

Appendix J
Primary Bodily/Kinesthetic Activities

Bodily/Kinesthetic - Activities that use the child's body, or part of it, to solve problems and communicate.

1. Finger play or body movement that relates to sound and shape of each letter
2. Body movements associated with beginning letter sounds, for example: letter g, grasshopper hops, gallop, groan, walk like a gorilla, and wave good-bye
3. Use body to make letter shapes
4. Write letter in soap bubbles on table tops
5. Play "Scram" a running flash card game
6. Alphabet games using balls and bean bags that are lettered
7. Living Letters - have students line up to form the shape of the letter
8. Eating letters by using cooking activities, pasta, or cereal

Appendix K
Primary Verbal/Linguistic Activities

Verbal/Linguistic - Activities to enhance the ability to use words and language in many different forms

1. Class books
2. Alphabet books
3. Story charts
4. Brainstorming
5. Stories
6. Poetry
7. Puppetry
8. Role playing

Appendix L
Primary Logical/Mathematical Activities

Logical/Mathematical - Activities that encourage the ability to discern patterns and approach situations logically.

1. Patterning using alphabet letters
2. Arrange letter cards or manipulatives in alphabetical order
3. Letter dominoes
4. Classify objects

Appendix M
Primary Musical/Rhythmic Activities

Musical/Rhythmic - Activities that develop sensitivity to non- verbal sounds in the environment such as rhythms, pitch, and tonal patterns.

1. Chants
2. Songs
3. Listening to recordings
4. Using musical instruments to rhythmically practice the alphabet

Appendix N
Primary Visual/Spatial Activities

Visual/Spatial - Activities that promote the ability to form a mental model and to be able to maneuver and operate using that model.

1. Cut out pictures that begin with each letter
2. Purple/Green Letters - Formation of letters with purple being the first stroke of the letter and green being the second stroke
3. Printing letters
4. Playdoh letters
5. Forming letters in a mini sandbox
6. Graphic organizers
7. Bags filled with gel

Appendix O

Interpersonal

cooperative groups
discussions
demonstrations
learning styles
peer coaching
lab teams
think-pair-share
human flash cards
story parts (oral reading)
role playing
jigsaw
KWL
dialogues and skits*
interviewing each other*
vocabulary contests with group points given*
people search*

*Asterisks indicate School D activities only

Appendix P

Intrapersonal

written, spoken, and drawn reflections on themselves, family and other students*
reflections on learning with multiple intelligences
reflections on Spanish and Spanish class*
PMI regarding group work
journaling
e-mailing teacher about class work
listing how things work
imagination of self as plant
listening to background music while reflecting

*Asterisks indicate School D activities only

Appendix Q

Bodily/Kinesthetic

classroom zones
task cards
floor work
energizers
role playing
hands on experiments*
body flash cards
class presentations
peer tutoring
beating rhythms
field trips-theater production
research
acting out vowel sounds, colors, animals, commands, dialogues*
poems, and skits*
dancing*
working math problems using students as the ciphers*
board work
pantomime emotions and physical conditions*
introduce themselves while ball throwing*

*Asterisks indicate School D activities only

Appendix R

Verbal/Linguistic

word searches
crossword puzzles
listen to stories and poetry tapes
foreign language tapes*
listening, speaking, reading, and writing simple sentences,
read stories aloud
read poetry loud
class discussions
writing assignments
vocabulary flash cards
research
technology
cooperative group work
worksheets
writing sentence patterns
oral and written reports
reading of student-written Spanish newspaper*
telephone game*

*Asterisks indicate School D activities only

Appendix S

Logical/Mathematical

predictions
graphic organizers
analogies
sentence patterning
patterns in nature
measurement
calculation
rhyme
probability
rhythm and rhyme patterns
sequence
technology (computers internet)
mnemonics
student-made crossword puzzles and word searches
KWL
justification of statements or opinions
construction of meaning from study patterns and connections from diverse conditions
rank order (fist to five)*
rubrics
counting*
verb conjugations*
subject combinations*
pronoun - noun substitution*
sorting parts of scrambled sentences*
word equations and formulas*
unscrambling vocabulary words*
Arrangement of individual parts of students' drawings so that the pieces fit together to form a whole that depicted a vocabulary word*

* Asterisks indicate School D activities only

Appendix T

Musical/Rhythmic

background music
Hispanic music*
rap songs*
sing Spanish alphabet to "Alphabet Song"*
sing vowel sounds to the "Witch Doctor" song*
Sing "ar" verb endings to "Row Your Boat"*
Sing the telling of time to Bill Haley's "Rock Around the Clock"*
technology
patterning
rhyme
drumbeat rhythm

*Asterisks indicate School D activities only

Appendix U

Visual/Spatial

flow charts
pictures (comic strips, project results)
posters
see and draw pictures
highlight
play
media*
bulletin board aids
graphic organizers
worksheet information (matching, directions)
rubrics
paper and pencil tests
vocabulary
flash cards (word/picture)
artifacts
perceptual visualization (putting plant on paper)
sentence patterns
plant structure
drawing rhythm and rhyme patterns
mnemonics
pictionary*
vocabulary collages*

*Asterisks indicate School D activities only

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